



Aalto University
School of Chemical
Technology

Master's thesis in Aalto CHEM

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About master's thesis work

- Compulsory part (30 cr) of studies – opportunity for specialization
- General learning objectives
 - Ability to apply the principles of science in solving research problems
 - Building on existing knowledge
 - Using scientifically relevant methodology
 - Logical argumentation based on facts
 - Improved skills for exact technical and scientific communication in writing and orally
 - To get experience in conducting an independent technical or scientific research project

Master's thesis work is a project

- Project/research plan
 - Goals and hypotheses
 - Schedule for deadline and milestones, e.g.
 - Literature review
 - Detailed research plan
 - Experimental work
 - Final thesis
 - Resources
 - Own work (30 cr = 800 h)
 - Other resources depending on the project
- Meetings and memos
 - With/to the supervisor, advisor, company representatives
- Deliverable = the written thesis

Main steps towards master's thesis

- Search for and agree on a topic in collaboration with a professor
 - Start the searching several months before the planned starting time of the thesis work
- Apply for approval of the topic from the Degree Programme Committee (DPC)
 - Check the application/meeting times beforehand
- Carry out the work and write the thesis
- Provide an oral presentation on the thesis and write a maturity assay
- Apply for approval of the thesis from DPC
 - Check the application/meeting times beforehand

Alternative master's thesis positions

- In Finland or abroad?
 - Professors have broad international research networks and most universities accept visiting master's thesis students
- In a company or other non-academic organization
 - Direct connections or through professors
 - The most important (50 %) way to become employed after the graduation
- In university
 - Projects funded by companies – often followed keenly by the companies (opportunity to get familiar with the company representatives)
 - Academically funded projects
 - Personal, non-funded project

Funding of master's thesis positions

- Direct salary
 - In companies; agreement between the company and the student
 - Externally funded full-cost projects in university; fixed salary level
- Personal grants
 - Funding through Aalto University's and other research foundations
 - In some cases directly from university or other organization
 - Additional grants available for students doing their master's theses abroad
- No compensation
 - Freedom in selection of the topic

Application for master's thesis topic

- Electronic application system
- Prerequisites
 - Completed Bachelor's degree or equivalent
 - Completed ≥ 45 cr of master's and ≥ 40 cr of major studies
 - Personal study plan made
- Information required (must be agreed beforehand with the supervisor)
 - Supervisor^a (name)
 - Advisor(s)^b (name, title, contact information)
 - Topic with the thesis language (English, Finnish or Swedish)
 - Degree programme and major

^aThe supervisor must be a professor in Aalto University

^bThe advisor(s) must own master's or higher academic degree

Approval of master's thesis topic

- By the Degree Programme Committee (DPC)
- DPC approves the topic and language of the thesis and nominates the supervisor and the advisor(s) under the following conditions:
 - The prerequisites are fulfilled and the topic meets the criteria for a master's thesis
 - The supervisor cannot be an advisor
 - The thesis can have one or two advisors (only their names should be printed in the thesis as advisors)
 - The topic must be informative and should not contain abbreviations
 - The approval is valid for one year (12 months) – the thesis should be submitted for approval within this time

Structure of master's thesis

- Introduction
 - Background for the research question: motivation, focus, aims, hypotheses
- Literature review
 - Should support solving the research question: understanding the system, learning from others and their research methodologies
 - Should be critical and analytical
- Experimental
 - Exact description of the experimental methods applied (to be repeated by anyone else)
- Results and discussion
- Conclusions

Structure of master's thesis

- Introduction
- Literature review
- Experimental
- Results and discussion
 - Exact and concise presentation
 - Focus on the main results (not individual observations)
 - Error analysis and reliability of the results
 - Connections to earlier literature
- Conclusions
 - Relative to the research question
 - Claims on novelty
 - Suggestions for further research

Numeric guidelines for the thesis work in general

- **Quality is always more important than quantity!**
- Typical workload division
 - Studying literature and writing the review: 30 %
 - Planning and executing the experiments and analyzing the results: 50 %
 - Finalizing the writing: 20 %
- Maximum length 70-80 pages with appendices
 - Appendices should be used for experimental details that are not necessary for understanding the main results/discussion
- Typical number of literature references is ≥ 50
- Discuss with your supervisor for personal guidelines!

Master's thesis and scientific article

- Scientific journals publish concisely written (i) literature reviews and (ii) original research papers
- In comparison with master's thesis, a scientific article is much shorter, more condensed and focused
- Master's thesis may contain new scientific data that could form basis of a scientific article
- Additional benefits from writing a scientific article on the thesis research work
 - Learning on 'real' scientific writing
 - (Co)authoring a scientific paper is a merit when applying for doctoral candidate positions

Evaluation criteria for master's theses

- Definition of the research scope and goals
 - Clarity, consistency, focus
- Command of the topic
 - Knowledge of relevant literature, depth of treatise
- Command of methodology
 - Selection and use of methods, error/reliability analysis of data
- Contribution to knowledge
 - Achieving the goals, novelty of the results, relevance and quality of conclusions
- Quality of formal presentation
 - Clarity, coherence, conciseness, language, graphic design
- Management of the thesis project
 - Own contribution, keeping in schedule

Evaluation of master's theses

- The thesis supervisor provides a numerical evaluation and a written statement to DPC and makes a suggestion for the grade (1-5)
 - If the supervisor proposes grade 1 or 5, an independent statement from another professor is required
- DPC decides on the grade based on the evaluation(s)
 - DPC can decide on a higher or lower grade in the case of an ambivalent statement and after an additional review of the thesis
- The student has a right to make an appeal on the grade
 - The appeals are handled by a university level body; an additional investigation by DPC is asked, usually including a more detailed statement from the supervisor

Area evaluated	1	2	3	4	5
Definition of the research scope and goals					
Definition of the research scope					
Presentation of the goals in the thesis					
Definition of the topic					
Command of the topic					
Command of the literature					
Command of the topic					
Methods, conclusions					
Command of the research method					
New significant results					
Correctness of the results and scrutiny of errors					
Conclusions, quantity, quality and relevance					
Contribution to knowledge and thesis structure					
Achieving goals					
Organisation, coherence and clarity of the thesis					
Share of independent input					
Keeping to the schedule					
Presentation and language					
Language					
Presentation and graphic design					
Grade proposal					

Grade distribution of master's theses

Statistics from previous few years

- Grade **5** (excellent): 10-15 %
- Grade **4** (very good): 55-65 %
- Grade **3** (good): 20-25 %
- Grade **2**: 5 %
- Grade **1**: 0 %
- Theses with grade **5** compete on few awards in each year
- Grade **4** is one of the requirements to get the right to study for doctor's degree at Aalto CHEM
- Few appeals yearly – typically no changes in grades

Publicity of master's theses

- Master's thesis is a public document
- A hardcopy will be availability in the library and an electronic copy will be saved in Aaltodoc database The student can give permission to publish the thesis and its abstract online (<https://aaltodoc.aalto.fi/>)
- The online publication can be delayed up to one year for reasons like
 - Filing a patent application
 - Submitting an article to a high impact scientific journal